Manitoba Agriculture

Lentil Production In Manitoba

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Lentil Production in Manitoba

Lentils are one of the oldest cultivated crops known, but production in Manitoba did not begin until 1970. By 1972 about 930 ha (2300 acres) were under contract. Annual lentil production has since risen to an average of 16,200 ha (40,000 acres), with the largest areas grown in 1987 at 24,300 ha (60,000 acres). Today, not all lentils are grown under contract.

Lentils are a high protein crop used primarily as human food, most commonly in soups and stews. The types grown in Manitoba are widely used in European countries and South America.

Four distinct types are now produced in Manitoba: Eston, which commands the bulk of the acreage; dark speckled, grown for the French market; the common Chilean type; and a small acreage of the variety Laird, the predominant variety grown in Saskatchewan and the lentil with the largest seed.

BOTANICAL DESCRIPTION

The lentil *(Lens esculenta)* is an annual legume, erect to prostrate in growth. Stems are slender with compound leaves similar to those of vetch. Flowers are small, and the plant may continue to flower until harvest if moisture is plentiful.

The plant produces many green pods, each containing one or two lens-shaped seeds. At maturity, seeds are pale green and from 5 to 8 mm (3/16 to 5/16 in.) in size.

Plant height will vary from 25 to 60 cm (10 to 24 in.) depending on lentil type and environmental conditions. The plants tend to lodge at maturity because of the weak stem.

Like all legumes, the lentil is able to capture nitrogen gas from the atmosphere and change it into chemical compounds which produce protein in the plant. Small nodules on the roots contain bacteria of the species Rhizobium which "fix" nitrogen from air spaces in the soil. The lentil is able to supply most of its nitrogen requirement by this means and is less dependent on soil supplies. Crops following lentils in the rotation also require less nitrogen fertilizer.

ADAPTATION

Generally, lentils mature in 90 to 100 days. Young plants can tolerate late spring frost, so early spring planting is possible. If planting is delayed until after mid-May, the time to maturity will be delayed. An early fall frost can damage immature seeds within the pods.

During an extremely hot spring, unprotected soil may become so hot that young stems constrict at soil level, causing the plant to collapse and die. This condition is called "heat canker."

Excellent yields of more than 2,464 kg/ha (2,200 lb./acre) can be obtained if rainfall is 25 to 28 cm (10 to 11

in.) and is distributed well within the first half of the growing season. Although lentils have a wide range of adaptation from sandy to clay soil, the most suitable soil is well drained, deep sandy-loam, high in phosphorus and potassium.

Areas of higher rainfall are usually unsuitable for lentil production because extra moisture promotes growth and delays crop maturity. Drought stress is needed to ensure plants switch from the vegetative phase into pod setting, particularly with the variety Laird.

Level fields with stone-free soils should be selected because lentils must be cut close to the ground for maximum yields. Small stones can be very difficult to remove from harvested seed and obviously have a serious impact on quality.

VARIETIES

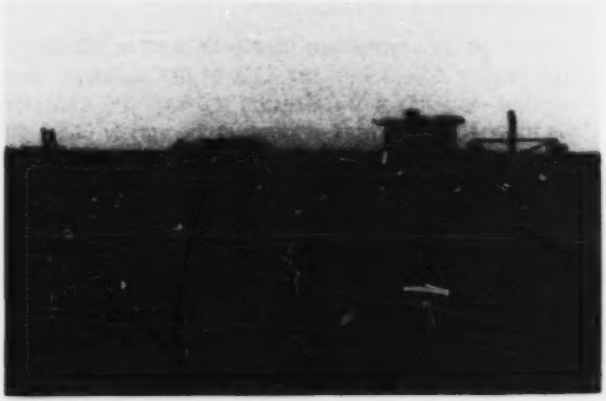
In the early years of lentil production, the common Chilean lentil was the most widely grown in Manitoba. This lentil is not registered in Canada, but has been grown under contract production.

Eston, a Persian-type, yellow cotyledon lentil, was developed at the University of Saskatchewan and registered in 1980. It is small-seeded, shorter in plant height, early maturing and well adapted to Manitoba, with yields about 25 per cent higher than Laird.

Laird, a Chilean-type, yellow cotyledon lentil, was developed at the University of Saskatchewan and registered in 1978. It is taller, later maturing, and larger-seeded than the common Chilean type. Yield has varied in Manitoba, but is generally similar to the common Chilean, depending on crop zone. It is not adapted to areas of higher rainfall due to it's indeterminant flowering habit.

There are no registered varieties of the dark specked lentil. As its name suggests, the seed of this type has a mottled appearance. It is about the same size as Eston, but slightly lower in yield.

For the latest information on variety development, growers should consult "Field Crop Recommendations for Manitoba" published annually by Manitoba Agriculture.



Seeding

SEEDBED PREPARATION AND PLANTING

The seedbed should be firm, smooth, moist and free from stones. When seeding into stubble, residues should be sufficiently incorporated to provide a level surface and permit a low cutting height at harvest. Some residue should be retained to help prevent wind erosion and excessive heating of the soil surface (see "heat canker"). Harrowing or packing is recommended after seeding.

Date of seeding: As early as possible up to May 15 (seedlings will tolerate several degrees of frost)

Seeding depth: 2.5 to 4.0 cm (1 to 1.5 in.)

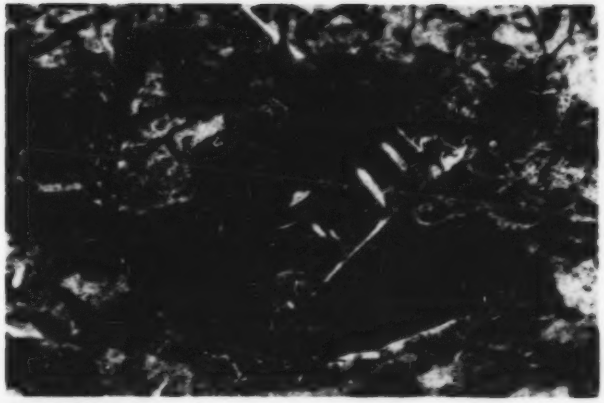
Seeding rate:

	kg/ha	(lb/acre)
Laird	78-90	(70-80)
Common Chilean	67-78	(60-70)
Eston	34-45	(30-40)
Dark speckled	34-45	(30-40)

Seed drill: Double disc press drill is recommended for uniform seeding depth. Hoe drills and air seeders may also be used.

Higher seed rates have been used to obtain a thicker stand, which may reduce lodging and improve the crop's competitive advantage over weeds. However, thicker stands are more prone to problems from reduced air circulation, slower maturity and disease, especially in wetter years.

Double disc press drills provide the most uniform planting depth. Operators should take care to prevent seed from "bridging" in the drill box. Bridging is minimized if the drill box is only partially filled.



Heat Canker

SEED AND INOCULATION

The use of high quality seed — preferably pedigreed which has been tested for disease — is strongly recommended. Before planting, seed should be inoculated with a specific nodule-forming, nitrogen-fixing bacterium (Rhizobium). Effective nodulation can provide substantially higher yields and increased protein content.

Apply commercially available inoculum to the seed just before planting. Ensure inoculated seed is protected from direct sunlight, as UV light rapidly kills the bacteria.

Commercially available stickers may be used to help adhere the inoculant to the seed. Non-proprietary sticking agents such as milk powder or wallpaper glue (with no additives such as antibiotics or fungicides) are also effective. If the seed has been treated with a fungicide, the amount of inoculum should be increased.

FERTILIZER

Soil tests should be used to obtain the most accurate fertilizer recommendation for a particular field. If soil test results are unavailable, these general recommendations may be followed:

Nodulated roots

Nitrogen fertilizer is not recommended because lentils can fix up to 70 per cent of their nitrogen requirements when properly inoculated. Excess nitrogen in the soil may delay maturity and cause excessive vegetative growth and poor pod set.

Phosphorus is recommended at 30 to 45 kg/ha (27 to 40 lb./acre) $P_2 0_5$ as a sideband application. If applied with seed, the maximum rate of $P_2 0_5$ is 20 kg/ha (18 lb./acre).

Sands, sandy loam and organic soils are frequently low in available potassium. On these soils apply 35 to 70 kg/ha (31 to 62 lb./acre) of potash ($K_2 0$). Potassium should be placed away from the seed.

An application of 20 kg/ha (18 lb./acre) sulphur is recommended on well-drained sandy soils and grey luvisol (grey wooded) soils.

WEED CONTROL

Lentils compete poorly with weeds, especially during the early stages of crop growth. Yield losses of up to 75 per cent can result from competition with grassy and broadleaf weeds. For maximum yields, lentil production requires a high degree of weed management.

CULTURAL WEED CONTROL

Use clean seed only, sown into a clean field. Select fields that are relatively free of perennial weeds such as Canada thistle, and annual species such as cleavers, kochia and night flowering catchfly. No chemical product can selectively control these weeds in-crop.

Severe weed competition

MECHANICAL WEED CONTROL

Excessive tillage increases the potential for soil erosion, particularly on lighter land. If lentils are to be grown on erosion-prone soils, consider using post-emergent chemicals if possible. This will eliminate the extra tillage operations required for preplant herbicides.

Tillage prior to seeding will destroy winter annuals as well as spring seedlings that have already germinated. Harrowing after seeding but prior to crop emergence can also be used to control newly-germinating weed seedlings. Harrowing after emergence until the lentils are 7 to 10 cm (3 to 4 in.) high will control weeds but frequently causes excessive crop damage and should be avoided if possible. To reduce crop damage with this operation, use a coil spring harrow on a hot, dry day. Avoid harrowing in damp weather or when dew is present to reduce the spread of disease.

CHEMICAL WEED CONTROL

Some herbicides have residual properties that can affect lentils for a number of years. Glean, Tordon 202 C, Lontrel, Bladex, Atrazine and several other herbicides may cause severe injury to lentils if the crop is planted too soon after use of these products.

Consult the Manitoba Agriculture's "Guide to Chemical Weed Control" for detailed information.

PREPLANT INCORPORATED

Rival 10 G or Treflan QR 5 (fall application only) – Control green and yellow foxtail (except trifluralin-tolerant green foxtail); barnyard grass and various broadleaf weeds including chickweed, cow cockle, lamb's quarters, red root pigweed and Russian thistle. Suppresses wild oats and wild buckwheat.

Incorporation requirements for trifluralin granules increases the potential for erosion on light-textured soils, on soils with light trash cover, and on fields which are in summerfallow. Although liquid trifluralin formulations are registered for fall application in lentils, incorporation requirements predispose most soils to erosion. For this reason, the use of liquid trifluralin formulations is not recommended for use in Manitoba.

POST EMERGENCE

Carbyne – Suppresses wild oats.

Excel and Hoe-Grass 284 – Control wild oats, green and yellow foxtail and barnyard grass. Excel also controls volunteer barley.

Poast and Poast Power Pack – Control annual grassy weeds, including volunteer wheat and barley.

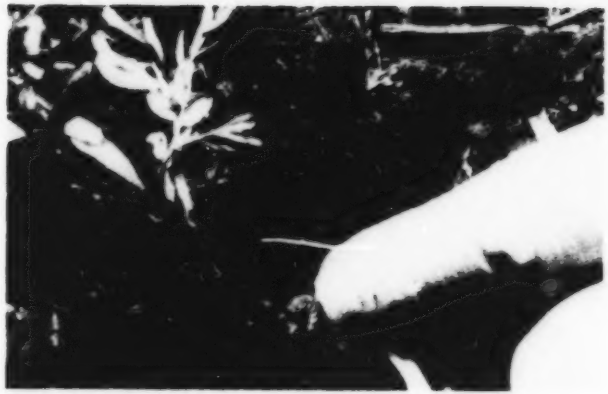
Sencor 500F and Sencor 75DF – Control several broadleaf weeds including chickweed, hemp-nettle, lamb's quarters, wild mustard, ball mustard and annual smartweed species. Can be applied in two sprayings spaced seven to 10 days apart for control of weeds with staggered emergence. Check the "Guide to Chemical Weed Control" for reduced rates required for this application.

DISEASES

Ascochyta blight, Anthracnose blight, Sclerotinia wilt, Fusarium root rot, and Rhizoctonia root rot are the major diseases affecting Manitoba lentils. Since there is no effective treatment, crop rotation remains the most practical method of minimizing these diseases.

Follow a four-year crop rotation to control soil-borne diseases. Avoid fababeans, field beans, field peas, mustard, canola, rapeseed, soybeans and sunflowers in the rotation because of Sclerotinia wilt (white mold).

To prevent Ascochyta blight, plant only clean, non-discolored, sound seed. If there is doubt that the seed is free from this pathogen, obtain a disease test. It is also advisable to turn under crop refuse after harvest and control volunteer seedlings.



Cutworm damage

Anthracnose caused serious yield loss in some lentil fields in 1989. Lesions develop on the stems and leaves, and are similar to ascochyta. However, anthracnose spreads more rapidly causing much higher yield losses. The disease does not appear to affect seed quality in the same way as ascochyta. Avoid peas and fababeans in the rotation because of possible anthracnose cross-infection. Plant disease-free seed.

INSECTS

Insect damage to lentils is seldom noted, but cutworms can damage the crop. Wireworms can also damage emerging seedlings. Blister beetles are occasionally noted, but damage has not been significant.

Cutworm larvae can destroy seedlings at or just below the soil surface by cutting off the seedling. They feed at night. Generally, cutworm damage occurs in late May or the first three weeks in June.

Wireworm larvae bore into lentil seeds or destroy young seedlings by damaging plants just below the soil surface. They are usually found in grass breaking.

If serious insect damage is found, consult the nearest Manitoba Agriculture representative or the "Manitoba Insect Control Guide."

HARVESTING

Desiccation — Desiccation kills green plant material, allowing earlier on-set of the dry-down process. It is therefore of benefit in seasons when late maturity is a problem, or when the earliest pods are beginning to shatter and plentiful moisture continues to stimulate flowering. Desiccation can help ensure the harvesting of a high quality crop.

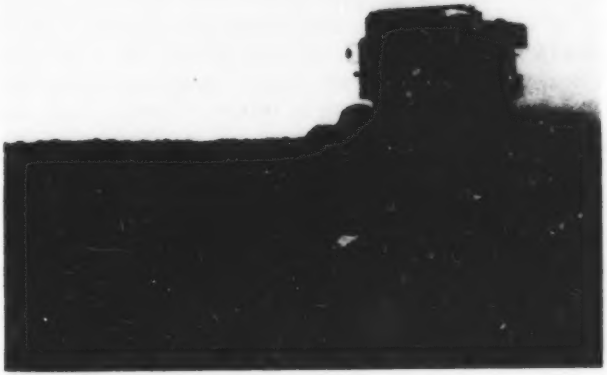
The only registered product for use as a desiccant on lentils in Reglone. The use of non-registered products is irresponsible, leading not only to potential loss of revenue for the producer due to detectable residues, but also to potentially serious damage to Canada's reputation as an exporter of quality product. Directions for desiccation provided on the product label or in the company literature should be followed carefully. Additional information can be obtained from the "Guide to Chemical Weed Control" published by Manitoba Agriculture.

Windrowing — Lentils should be swathed when plants begin to turn yellow and lower pods become brown to yellow-brown. This color change will occur within several days and should be watched carefully, as well-matured pods can readily shatter. Lentils should be swathed when there is sufficient moisture to toughen the lower pods. Avoid swathing during hot, dry periods of the day to minimize shattering.

Lentils have a weak stalk and tend to lodge badly, so an extremely low cut is required to minimize losses. Windrowing can be very slow, difficult and frustrating. The field surface must be dry, level, firm and free of stones to minimize difficulties and losses.

A pick-up reel and lifter guards are very helpful when windrowing. A floating cutterbar mounted on a windrower can further minimize windrowing losses and operational difficulties. Because this attachment is designed for a combine header, several modifications are necessary to mount it on a windrower.

Ultra-high molecular weight (UHMW) plastic has been used with good success as a liner for the skid bar on windrower headers and floating cutterbars. This



Threshing

material permits the cutterbar to slide across soil more easily, resulting in less soil bunching. UHMW is especially advantageous when the soil surface is damp or moist.

Depending on the weather, windrowed lentils may take one or two weeks, or even longer, to dry down. Since the lentil windrow has no strong stubble to hold it off the ground, air circulation through the windrow is poor. This may result in seed discoloration and mold development during long periods of wet weather.

Combining the Windrow — Lentils are considered dry at 14 per cent moisture content. Combining at or below this moisture level can result in high pick-up losses and damaged seeds. It may therefore be advisable to combine at a higher moisture content of 16 to 18 per cent, and dry artificially. The cost of drying may be recovered many times over by reduced losses, improved quality and earlier harvest.

Straight Combining — If the crop is uniformly mature, it may be possible to straight combine lentils. This should only be attempted at moisture levels of 18 to 20 per cent or higher, to avoid excessive pre-harvest shattering. The combine should be equipped with a floating cutterbar to minimize header losses.

Once in the combine, lentils thresh with ease. A slow cylinder speed of approximately 400 rev./min. is necessary to prevent cracking dry lentils. The concaves should be set fairly wide, particularly if the lentils are dry. Initial wind and sieve settings for wheat may be used.

Drying — Lentils can be dried successfully in heated air dryers. A maximum temperature of 45°C (120°F) is recommended to minimize stress cracks.

Natural air drying of lentils has several advantages over heated air drying:

- Stress cracks are eliminated.
- A heated air dryer is not required.
- Less supervision is necessary.
- Reduced augering results in less cracking and chipping.

Proper design of a natural air drying system is critical. Inadequate airflow may cause heating and spoilage. For

help in designing a natural air drying system, consult your local agricultural engineer. Further information on natural air drying is available from the Manitoba Agriculture publication "Movement of Natural Air Through Grain."

MARKETING

Growing lentils under contract offers producers both price and delivery security. To determine which contract is best suited to their particular marketing strategies, producers should discuss the options available with one or more of the several companies offering lentil contracts.

Delivery opportunities for non-contract lentils can be excellent, with very attractive "spot" prices. However, it may be risky to grow lentils without forward pricing at least part of the production. Before making a decision, producers should fully understand the implications of growing lentils with or without a contract.

Many producers consider the following strategy a sound one: forward sell part of the expected production at a fixed price, then sell the balance of the production in the fall or later at the "spot" price. Such a policy provides some price protection against a falling market, plus the opportunity to benefit from market strength on a portion of the crop.

POSITIVE SOIL MANAGEMENT

These soil management practices can help reduce erosion on a lentil crop:

Field Shelterbelt

On sandy soils field shelterbelts are recommended as the major conservation practice. The distance between belts should be 200 m (660 ft.), with trees in the belt spaced 1.8 to 2.4 m (6 to 8 ft.) apart.

Tillage

Fall tillage following harvest is not recommended because crop residue is light. What residue there is should be distributed by a straw spreader attached to the harvest equipment.

Cover Crops

Cover crops are small grains that are seeded on harvested field bean, pea and lentil land to control erosion. If fall rye is to be harvested the following year, recommended seeding dates are August 25 to September 15. The seeding dates for other small-grain cover crops are from immediately after harvest to October 1.

For more information on the production of lentils and other pulse crops in Manitoba, contact your nearest Manitoba Agriculture office or the Soils and Crops Branch, Manitoba Agriculture.